

# Anxiolytic Potential of *Abies pindrow* Royle: A Systematic Review of its Phytochemical Constituents and Anti-Anxiety Activity

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**Abstract**—Due to the prevalence of anxiety disorders and their crippling effects, new treatment medicines must be investigated. There have been reports of anxiolytic effects from the herb *Abies pindrow* Royle, which is utilized in traditional medicine. Though the plant has not been thoroughly studied to support its traditional claims, *Abies pindrow* Royle (Himalayan Silver Fir; Pinaceae) has been used traditionally to cure anxiety. Investigating the antianxiety properties of different *A. pindrow* extracts and fractions was therefore planned. Solvents in increasing order of polarity, namely n-hexane, chloroform, methanol, and water, were used to extract the aerial parts of properly identified *A. pindrow* in a methodical and thorough manner. In mice, all crude extracts were tested for antianxiety effects at dosages of 100, 200, or 400 mg/kg, p.o.

*A. pindrow*'s effectiveness was statistically contrasted with that of the common anxiolytic medication. When compared to the control, the chloroform and methanol extracts showed the most antianxiety effects and were statistically equivalent to the usual medication at doses of 200 and 400 mg/kg, respectively. n-hexane, ethyl acetate, and 1-butanol were the solvents used to partition the bioactive methanol extract in ascending order of polarity. Additionally, mice were given dosages of 25 or 50 mg/kg, p.o., of all fractions to test their antianxiety properties. At a dose of 50 mg/kg, only the ethyl acetate fraction (EAF) demonstrated considerable antianxiety effect comparable to the conventional medication. Current research has scientifically confirmed *A. pindrow*'s traditional claims of antianxiety properties. It has been proposed that flavonoids from the aerial sections of *A. pindrow* may help cure anxiety problems.

**Index Terms**—Pindrow, *Abies* Royle, phytochemical components, anti-anxiety action, systematic review.

## I. INTRODUCTION

In the secondary medical health care system, anxiety is the most prevalent disorder [1]. Anxiety is a mood disorder that affects people generally and doesn't have a clear cause [2]. As such, it differs from fear, which arises when a threat is perceived. "Anticipation of impending danger and dread accompanied by restlessness, tension, rapid heartbeat, and rapid breathing that may or may not be associated with a certain event or situation" is a typical definition of anxiety. Fear, on the other hand, is said to be targeted and specific. The disorder is linked to substantial personal suffering, a lower quality of life, higher rates of sickness and mortality, and a substantial financial cost. It usually persists for many years. According to the World Health Organization (WHO), anxiety is the sixth most common cause of overall weakness [3]. There are 264 million people worldwide that suffer from stress-related conditions. Females are more likely than humans to be misgiving wrecks [4]. According to WHO data, 3.6% of men and 7.7% of women are estimated to experience the severe effects of anxiety disorders. In 2015–16, the NMHS of India showed that the average weighted routineness for any psychological awfulness was 10.6% for current mental ominousness and 13.7% for lifetime psychological awfulness. Mental health problems are more common in people over 60 or in those between the ages of 30 and 49. Fear or anxiety is an inevitable part of everyday living [5]. It is an essential sign of a number of mental health disorders and an almost inevitable part of a number of clinical and medical problems [6]. Age, sex, natural characteristics, working conditions, or yield are all irrelevant. Similar to dysregulation of the serotonergic system, fear or apprehension can result from the over-advancement (progression) of the adrenergic framework. Although anxiety is difficult to

identify and might interfere with regular productive activities, it can be classified as either "pathological" or "normal" [7]. The most popular treatment for mood disorders at the moment is pharmaceutical therapy. Despite the fact that many medications seem to be useful in treating the most serious mental diseases, many people claim that the medications are useless for some individuals and lead to tolerance and other negative side effects [8]. Emerging clinical instances have shown that patients and health professionals are becoming more interested in phytomedicine [9]. A multidisciplinary strategy is used in the creation of

plant-derived anti-anxiety medications [10], which involves pharmacological, phytochemical, and ethnopharmacological surveys, among other things. Numerous researches have demonstrated that complementary and alternative medicine is frequently used to treat mental illnesses, especially anxiety and depression. Among the supplementary therapies used for therapy, herbal medicine has gained a substantial following [11]. Herbs used to treat anxiety, depression, or sleeplessness have been well described in recent years.

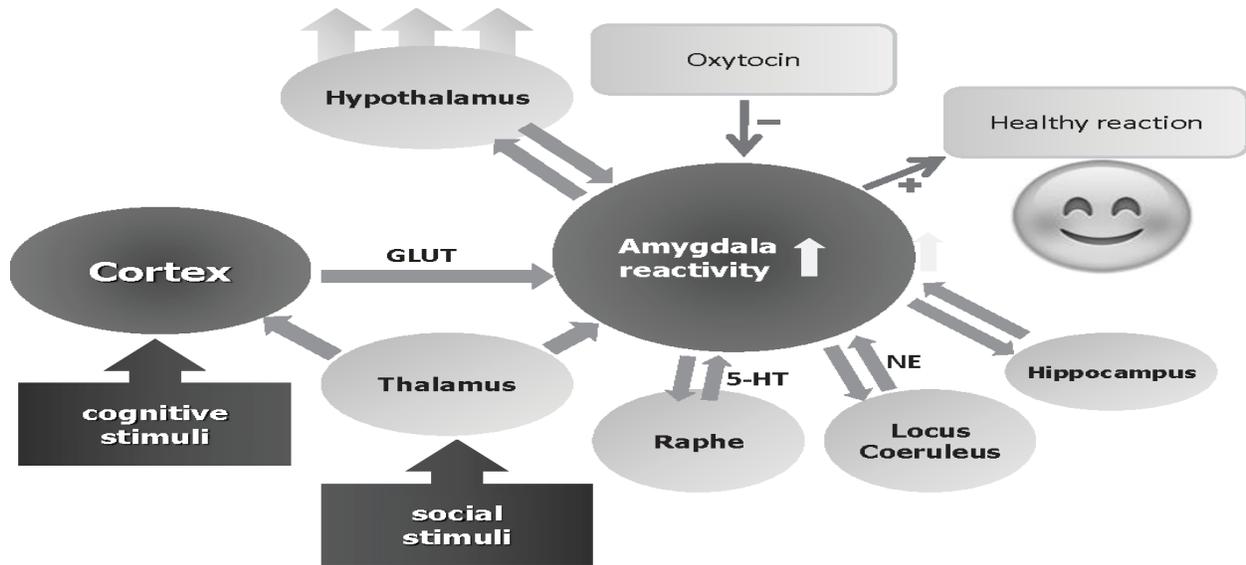


Fig:1 pathophysiology of anxiety

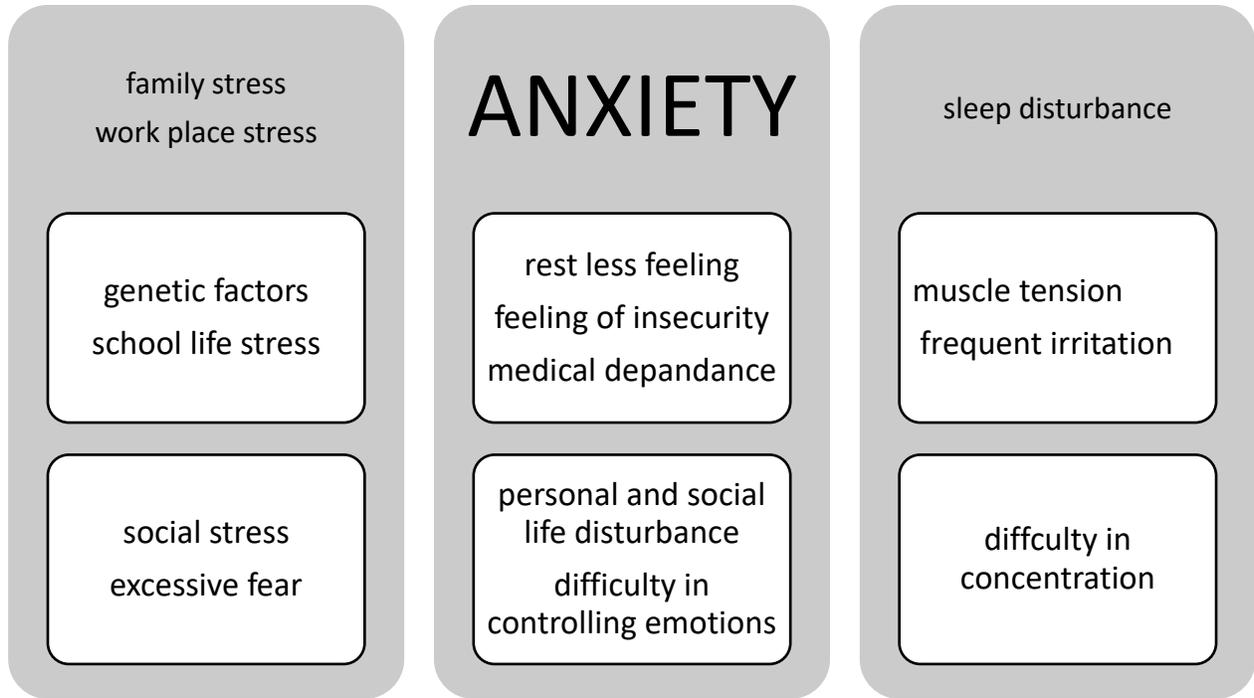


Fig.2: General overview of anxiety disorder

Types of anxiety Type

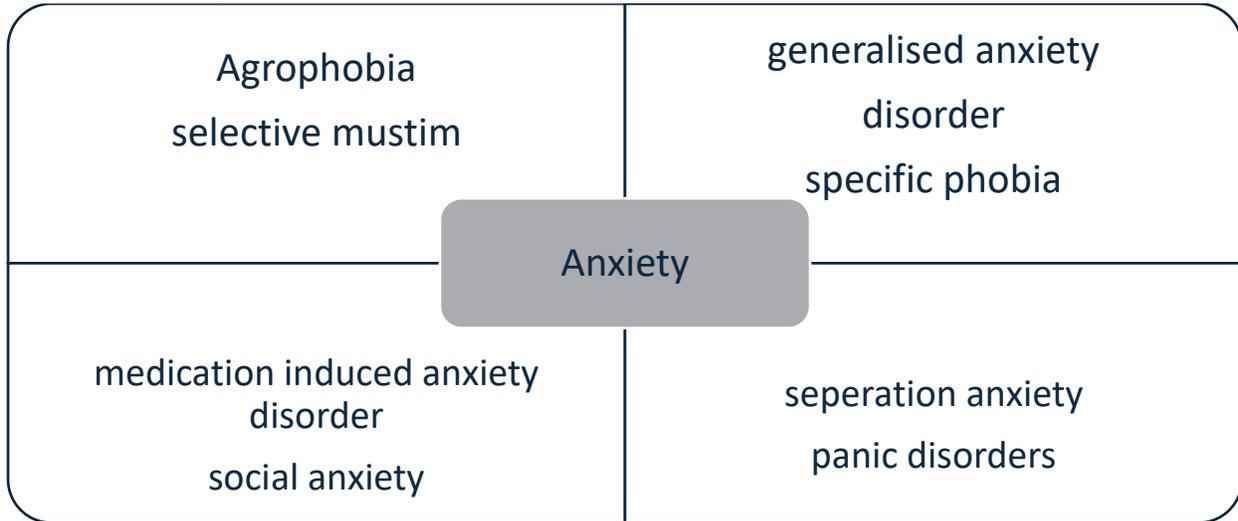


Fig.3: types of anxiety

II. VARIOUS MECHANISMS INVOLVED IN THE ANXIETY

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Management of anxiety:

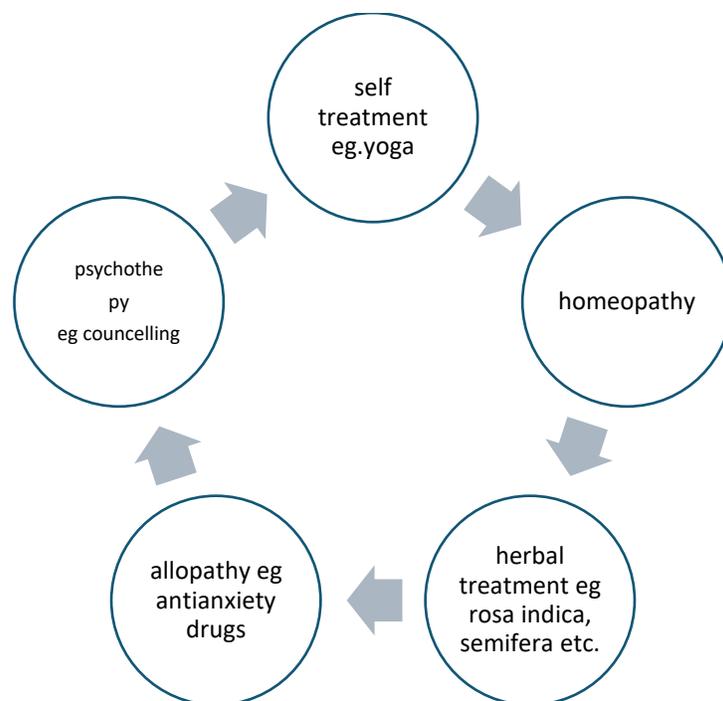


Fig.4: management of anxiety

### III. USING MEDICINAL HERBS TO CURE ANXIETY

Plants have been recognized for their immense ability to cure diseases since ancient times. Ancient plant-based healing and longevity techniques have been passed down through Ayurveda and Unani [15]. Ancient medical and folk medicine systems have been found to be more effective in treating health issues globally, according to the "World Health Organization" [16]. About 60% of people worldwide use traditional medicine in rural areas of developing nations, and it is becoming more and more popular in wealthier nations where modern treatments predominate. Lack of sufficient scientific knowledge and a better grasp of the efficacy and safety of the herbal product is arguably the biggest obstacle to the free use of herbal medicines in the routine practice of prescribing. The anxiolytic qualities of a wide range of plants are being investigated. Herbal medications primarily work by modulating brain transmission through the binding of particular plant metabolites to neurotransmitter/neuromodulator receptors, as well as by changes in neurotransmitter production and overall function [17].

### IV. ABIES PINDROW ROYLE, A MEMBER OF THE PINACEAE FAMILY

The herb *Abies pindrow* Royle (Himalayan Silver Fir; Pinaceae) has a long history of being used to relieve anxiety [18]. Although uncharacterized crude extracts of *A. pindrow* aerial parts have been used in this pharmacological investigation, it is widely distributed at elevations between 2000 and 3000 m throughout the Western Himalayas, from Afghanistan to Nepal, and has been suggested to have a role in treating anxiety disorders [19]. Therefore, to validate traditional claims, particularly for anxiety disorders, thorough research on *A. pindrow* aerial components is required. The authors' current research differs from earlier studies [20] in the following ways:

- (a) To assess the antianxiety properties, many extracts of *A. pindrow* aerial parts have been made one after the other.
- (b) To purify crude extract, bioactive extract fractionation has been carried out.
- (c) A particular class of phytoconstituents has been proposed as the cause of the activities and their likely mechanisms of action [21].

### V. IDENTIFICATION AND COLLECTION OF PLANT MATERIAL

In September 2018, aerial pieces of *Abies pindrow* were taken from Gulaba Kothi, Manali, which is

situated at a height of 2000–2100 meters in India. The plant's identity was verified by Dr. Sunita Garg, the Chief Scientist and Head of the National Institute of Science Communication and Information Resources' Raw Materials Herbarium and Museum in New Delhi.



Fig.4: abbies p.royle

#### VI. Pharmacological potential of *abbies p.royle* : Extract and fraction preparation

The aerial parts of *A. pindrow* were ground into a powder in a grinder after being sun-dried. Two kilograms of dried powdered plant material were extracted in a Soxhlet system [22] utilizing solvents in ascending order of polarity, specifically methanol, chloroform, and n-hexane. The plant material's marc was boiled for two hours on a hot plate with distilled water to create the water extract [23]. N-hexane extract (HE), chloroform extract (CE), methanol extract (ME), and water extract (WE) were obtained by

recovering solvents and water from crude extracts under reduced pressure using a rotary vacuum evaporator. 100 g of the plant material's bioactive extract was evenly suspended in water [24], put in a round-bottom flask, and then separated using solvents in ascending order of polarity—n-hexane, ethyl acetate, and 1-butanol—by heating it to 50°C for 30 minutes while stirring constantly. Eight more times, this partitioning process was carried out with each solvent. To obtain the n-hexane fraction [25] (HF), ethyl acetate fraction (EAF), 1-butanol fraction (BF), and residual bioactive extract (RBE), all of the isolated layers of each solvent were combined and condensed under low pressure. To identify the different classes of phytoconstituents present, a variety of extracts and fractions were screened for phytochemicals [26].

#### VII. NUMEROUS PHYTOCHEMICALS FOUND IN ABIES PINDROW MAY BE RESPONSIBLE FOR SOME OF ITS POSSIBLE ANTI-ANXIETY BENEFITS.

- A. Terpenoids: These substances have sedative and anxiolytic qualities. Terpenoids like as limonene, pinene, and borneol are found in *Abies pindrow* [27].
- B. Flavonoids: *Abies pindrow* has been shown to contain flavonoids such as apigenin, kaempferol, and quercetin. It has been demonstrated that these substances have antidepressant and anxiolytic properties [28].
- C. Alkaloids: *Abies pindrow*'s alkaloids may also be involved in its possible anti-anxiety benefits. However, further investigation is required to validate this.
- D. Phenolic chemicals: *Abies pindrow* has been found to contain phenolic acids and lignans, among other phenolic compounds [29]. These substances have been shown to have neuroprotective and anxiolytic properties. It's important to remember that although these phytochemicals might be involved in *Abies pindrow*'s possible anti-anxiety properties, further study is required to verify the plant's effectiveness and safety in treating anxiety.

Table 1-Major constituents of different plant parts of *Abies pindrow*

Plant components	Compounds' nature	The compound's name	Citation
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The stem	Fluorone and Chalcones	Okanin, Butein, Okanin-4'-O- $\beta$ -D-glucopyranoside, and 2',3'4':3,4-pentahydroxychalcone-4'-(L arabinofuranosyl- $\alpha$ -1 $\rightarrow$ 4-D-glucopyranoside- $\beta$ ) The trihydroxyflavonone 8,3'4'-7-O- $\beta$ -D-glucopyranoside	[30] [30]
The Leaf	Hydrocarbons Derivative of the heterocyclic ketone lanostane	Nonadecane; Octadecane; Tricosane; Eicosane; Henicoasane; Docosane; Tetracosane; 1-Octadecane; 1-Heptadecane; 1-Docosene; Tetramethylhexadecane (2,6,10,14) 3-Maltol, or hydroxy-2-methyl-4H-pyran-4-one Pindarolactone	[31] [32] [33]
The Leaf	The Fatty acid	Cyclopentaneundecenoic acid, n-tetradecanoic acid, n-pentadecanoic acid, 14-methyl-pentadecanoic acid, 14-methyl hexadecanoic acid, 16-methyl-heptadecanoic acid, cis-9-octadecenoic acid, 5,9-octadecadienoic acid, 17-methyl-octadecanoic acid, docosanoic acid, and tetracosanoic acid.	[34]
The Stem & Leaf	The Terpenes	$\alpha$ -Thujene, $\alpha$ -Terpinene, $\alpha$ -Humulene, $\alpha$ -Selinene, $\alpha$ -Muurolene, $\alpha$ -Longipinene, $\alpha$ -Calacorene, $\beta$ -Pinene, $\beta$ Caryophyllene, $\beta$ -Elemene, $\gamma$ -Terpinene, $\gamma$ -Elemene, $\gamma$ -Muurolene, $\delta$ -2-Carene, $\delta$ -Elemene, $\delta$ -Cadinene; p-Cymenene; p-Cymenene; Linalool; Camphene; Sabinene; Myrcene; Limonene; Terpinolene; Kaurene; Abietadiene; Abietatriene; Germacrene D; Camphene hydrate; trans-Sabinene Hydrate; Humulene oxide II.	[35] [35] [35] [36] [36]
Essential oil from leaf	Terpenes Terpene alcohol Terpene esters Terpene-ketone Dialkyl ketone Hydrocarbons Aldehyde Alcohol Ether	Santene; Tricyclene; Myrcene; Sabinene; Camphene; Abietadiene; $\alpha$ -Pinene; $\alpha$ -Phellandrene; $\alpha$ -Humulene; (E)- $\alpha$ -Bisabolene; (+) -(R)-Limonene; (+)-3-Carene; $\beta$ -Pinene; $\beta$ -Bisabolene; $\beta$ -Alaskene; $\gamma$ -Bisabolene; $\gamma$ -Terpinene; Germacrene D; Camphene hydrate. $\alpha$ -Terpineol; Terpinen-4-ol; cis-Piperitol; trans-Piperitol; Citronellol; Isoborneol; Abienol; Epicubanol; (E)-Nerolidol; Cadin-4-en 10-ol; epi- $\alpha$ -Bisabolol; T-Muurolol; Fenchyl alcohol; (E)-p-2-Menthen-1-ol; $\beta$ -Linalool Bornyl acetate; Menthyl acetate; Citronellyl acetate; Geranyl acetate; Trans-Piperitol acetate; Myrtenyl acetate; $\alpha$ -Terpinyl acetate. Piperitone Undecan-2-one Tetracosane Dodecanal n-Dodecan-1-ol Carvacryl methyl ether	[37] [37] [37]

## Ethnobotanical Uses:

Table 2-Abies pindrow is widely used by the people of the Himalayan region for both non-medical and medicinal purposes. Building materials, furniture, and fuelwood are all made from the plant, and it is used medicinally to treat a variety of illnesses, such as fevers and coughs.

S. no	Area	The colloquial term	Uses in ethnomedicine	Additional applications	Citation
1.	Pakistan conquered the Poonch Valley in Kashmir.	Hindko/Kashmiri: Tung	Branches: Fuel Cones: For aesthetic reasons.	Wood: Timber used to construct furniture, beams, and bridges	[38]
2.	Pakistan's Ayubia National Park, Abbottabad	Fir in English	Inner Bark: Asthma is treated with inner bark powder.	Wood: Used as fuel wood and to make furniture and house beams	[39]
3.	Kashmir was occupied by Pakistan.	Fir in English	Leaves and bark are used as feed.	Wood: Fuel	[40]
4.	Muzaffarabad, Pakistan-occupied Kashmir's Neelam Valley	Rewar in Hindko, Fir in English	Root: A decoction used to cure bronchitis, phthisis, and cough. Leaf: A juice that helps babies with dental pain. Leaf powder is used to cure fever, bronchitis, and cough.	Wood: Used as fuelwood and to build windows, doors, homes, and furniture.	[41]
5.	Pakistan's Kaghan Valley	Hindko: Rewar, Paludar	Leaves: The dried leaves' tincture or decoction is used to treat cataracts, asthma, chronic bronchitis, and cough. They are also used to treat various lung conditions and bladder disorders. Fresh leaf juice is used to alleviate chest issues, newborn fever, and dental pain.		[42]
6.	Jammu and Kashmir	Kashmiri: Badul, Drewar, Tung	Leaf: A mixture of ground leaves and honey is used to treat colds and coughs. Asthma is also treated with leaves.	Wood: Used to make furniture, structures, even cake packaging. As fuel, branches are utilized.	[43]
7.	India's Mornaula Reserve Forest in Kumaon	Rago Kumaoni	Fuel and rheumatism relief are provided by resin and bark.		[44]
8.	India's Kedarnath Wildlife Sanctuary in Garhwal	Western Himalayan Fir in English	Bark: Bronchitis and cough are treated with the extract.		[45]

9.	India's Nanda Devi Biosphere Reserve	Ragu Kumaoni	Leaf: To lessen swelling in wounded areas, apply paste. Wood: Used to make furniture and for construction.		[46]
10.	India's Theog Forest Division in Himachal Pradesh	Hindi: Tosh, Himachali: Thaneira	Leaf: To alleviate milk clotting and udder swelling, leaf paste is administered to the cow's udder.		[47]
11.	Nepa's Baitadi and Darchula districts	Byanshi/Rang: Himisin	Woods: Used for farming tools and medicine.	Woods: Used for butter churners, furniture, fuelwood, and prayed flags	[48]

#### VIII. PHARMACOLOGICAL POTENTIAL OF ABBIES P.ROYLE

Antixiolytic activity: Antixiolytic medications are used to treat anxiety, agitation, and insomnia, three significant cognitive issues that doctors commonly address [49]. The impact of *A. pindrow* leaves on different behavioral models of anxiety in rats was evaluated using a methanolic extract of the leaves. Rats given extracts at 50 and 100 mg/kg were shown to exhibit open field ambulation, rearing, self-grooming, and center activity in comparison to rats given simply vehicles. Compared to the control, this was accompanied by heightened plus maze behaviors, which were marked by a notable increase in time spent and entries made in open arms and a decrease in time spent and entries made in enclosed arms. Significant increases in the amount of time spent in open arms, the frequency of head dips in elevated zero maze, and the number of entries in open arms were also indicative of elevated zero maze behavior. Overall behavioral pattern improvement following treatment with *A. pindrow* leaf extracts suggests antixiolytic action [50]. In a different study [51], Laca mice were used to test the antianxiety effects of hexane, chloroform, methanol, and water extracts of aerial portions at dosages of 100, 200, or 400 mg/kg. The study found that the chloroform and methanolic extract significantly reduced anxiety, as demonstrated by the rise in the number of open arms entries and open arms time in the elevated plus maze model. Additionally, according to the elevated plus maze test conditions, the

ethyl acetate fractions demonstrated strong anti-anxiety activity.

#### IX. CONCLUSION AND FUTURE ASPECTS

The vast advantages that natural products offer to humanity make life impossible to envisage without them. Particularly when it comes to modern medications derived from nature and traditional medicines, herbal products have a big influence on public health. Millions of people worldwide rely on traditional medicines to address their health needs, despite their limitations. We continue to rely significantly on the medicinal qualities of plants today, and herbs have long been valued for their ability to relieve pain and promote recovery. It is claimed that natural herbs and herbal mixes that function well together can effectively alleviate anxiety. The review looked at every aspect of traditional medicine and concluded that more thorough, standardized, experimental research is required to learn more about the plants and how they might be used to treat serious issues like anxiety. Enhancing the medication development process is the goal of using natural products and medicinal plants more effectively and efficiently. According to the study, *Abbies pindrow* royle's ethanolic extract has a favorable safety profile and substantial antixiolytic activity in mouse models. According to these findings, *A.pindrow* shows promise as a supplemental or natural treatment for anxiety disorders. To explore various extracts, comprehend mechanisms, optimize dosage, and demonstrate efficacy and safety through long-term and

clinical studies, more research is necessary. Thus, studies must be conducted to introduce clinical trials in order to further investigate the pharmacological activities employing humans. A pindrow can be used to investigate the effectiveness against diseases related to inflammation since it possesses anti-inflammatory properties that can modulate a wide range of inflammatory response-related diseases. Furthermore, more research is required to clarify the pharmacological activities of the bioactive chemicals identified from A. pindrow. Numerous investigations have reported that chalcones exhibit antiproliferative properties [54,55] and significant antioxidant properties [52,53].

#### REFERENCES

- [1] Remes, O., Brayne, C., Van Der Linde, R., & Lafortune, L. (2016). A systematic review of reviews on the prevalence of anxiety disorders in adult populations. *Brain and behavior*, 6(7), e00497.
- [2] Rowa, K., Waechter, S., Hood, H. K., & Antony, M. M. (2017). Generalized anxiety disorder. *Psychopathology: History, Diagnosis, and Empirical Foundations, Third Edition*, 149-186.
- [3] Garbarino, S., Lanteri, P., Durando, P., Magnavita, N., & Sannita, W. G. (2016). Co-morbidity, mortality, quality of life and the healthcare/welfare/social costs of disordered sleep: a rapid review. *International journal of environmental research and public health*, 13(8), 831.
- [4] Monakhova, S. (2022). *Identification of Re-assessment Intervals to Support a Measurement Based Care (MBC) approach with the interRAI Community Mental Health (CMH) Assessment* (Master's thesis, University of Waterloo).
- [5] Poland, W. S. (2016). The analyst's fears. *American Imago*, 63(2), 201-217.
- [6] Burnham, T., & Phelan, J. (2018). *Mean genes: From sex to money to food: Taming our primal instincts*. Hachette UK.
- [7] LeDoux, J. (2017). *Anxious: The modern mind in the age of anxiety*. Simon and Schuster.
- [8] De Hert, M., Correll, C. U., Bobes, J., Cetkovich-Bakmas, M., Cohen, D. A. N., Asai, I., ... & Leucht, S. (2018). Physical illness in patients with severe mental disorders. I. Prevalence, impact of medications and disparities in health care. *World psychiatry*, 10(1), 52.
- [9] Rapoliene, L., & Matuleviciute, V. (2024). Future Prospective of Herbal Medicines for Lifestyle Diseases. In *Role of Herbal Medicines: Management of Lifestyle Diseases* (pp. 615-635). Singapore: Springer Nature Singapore.
- [10] Chaachouay, N., & Zidane, L. (2024). Plant-derived natural products: a source for drug discovery and development. *Drugs and Drug Candidates*, 3(1), 184-207.
- [11] World Health Organization. (2019). *WHO global report on traditional and complementary medicine 2019*. World Health Organization.
- [12] Purves, K. L., Coleman, J. R., Meier, S. M., Rayner, C., Davis, K. A., Cheesman, R., & Eley, T. C. (2020). A major role for common genetic variation in anxiety disorders. *Molecular psychiatry*, 25(12), 3292-3303.
- [13] Alshaya, D. S. (2022). Genetic and epigenetic factors associated with depression: An updated overview. *Saudi journal of biological sciences*, 29(8), 103311.
- [14] Khushboo, Siddiqi, N. J., de Lourdes Pereira, M., & Sharma, B. (2022). Neuroanatomical, biochemical, and functional modifications in brain induced by treatment with antidepressants. *Molecular Neurobiology*, 59(6), 3564-3584.
- [15] Zaigham, H., Tauheed, A., & Ali, A. (2019). Recent trend in traditional medicine dosage form and present status of Unani and Ayurvedic medicine. *Int J Pharm Sci & Res*, 10(4), 1640-49.
- [16] Ansari, S. (2021). Overview of traditional systems of medicine in different continents. In *Preparation of Phytopharmaceuticals for the Management of Disorders* (pp. 431-473). Academic Press.
- [17] Dalangin, R., Kim, A., & Campbell, R. E. (2020). The role of amino acids in neurotransmission and fluorescent tools for their detection. *International journal of molecular sciences*, 21(17), 6197.
- [18] Kumar, D., & Kumar, S. (2017). A Complete Monographic Study on Abies pindrow Royle Aerial Parts. *Indian journal of pharmaceutical Sciences*, 79(6).
- [19] Sinha, D. (2019). Ethnobotanical and pharmacological importance of western Himalayan fir Abies pindrow (Royle ex D. Don)

- Royle: a review. *Journal of Pharmaceutical Research International*, 31(6), 1-14.
- [20] Ancuceanu, R., Anghel, A. I., Hovanet, M. V., Ciobanu, A. M., Lascu, B. E., & Dinu, M. (2024). Antioxidant activity of essential oils from Pinaceae species. *Antioxidants*, 13(3), 286.
- [21] Barbieri, R., Coppo, E., Marchese, A., Daglia, M., Sobarzo-Sánchez, E., Nabavi, S. F., & Nabavi, S. M. (2017). Phytochemicals for human disease: An update on plant-derived compounds antibacterial activity. *Microbiological research*, 196, 44-68.
- [22] Zirari, M., Aouji, M., Imtara, H., Hmouni, D., Tarayrah, M., Noman, O. M., & El Mejdoub, N. (2024). Nutritional composition, phytochemicals, and antioxidant activities of *Abies marocana* Trab. needles. *Frontiers in Sustainable Food Systems*, 8, 1348141.
- [23] Silva, G. L., Lee, I. S., & Kinghorn, A. D. (1998). Special problems with the extraction of plants. *Natural products isolation*, 343-363.
- [24] Li, Z., Fan, Y., & Xi, J. (2019). Recent advances in high voltage electric discharge extraction of bioactive ingredients from plant materials. *Food chemistry*, 277, 246-260.
- [25] Kiene, M., Blum, S., Jerz, G., & Winterhalter, P. (2023). A Comparison between High-Performance Countercurrent Chromatography and Fast-Centrifugal Partition Chromatography for a One-Step Isolation of Flavonoids from Peanut Hulls Supported by a Conductor like Screening Model for Real Solvents. *Molecules*, 28(13), 5111.
- [26] Wangchuk, P. (2024). *Phytochemical analysis, bioassays and the identification of drug lead compounds from seven Bhutanese medicinal plants* (Doctoral dissertation, University of Wollongong).
- [27] Alambayan, J., & Garg, V. (2020). Overview on Phyto-based Treatment for Anxiety. *Current Psychopharmacology*, 9(3), 185-210.
- [28] Arora, D., & Gautam, R. K. (2022). Natural Products: Ray of Hope for Anxiety Disorders. *Current Traditional Medicine*, 8(1), 55-68.
- [29] Assad, R., Reshi, Z. A., Mir, S. H., Rashid, I., Shouche, Y., & Dhotre, D. (2021). Bioprospecting appraisal of Himalayan pindrow fir for pharmacological applications. In *Phytomedicine* (pp. 461-482). Academic
- [30] Tiwari KP, Minocha PK. A chalcone glycoside from *Abies pindrow*. *Phytochemistry*. 1980; 19:2501-2503.
- [31] Samejo MQ, Burdi DK, Bhanger MI, Talpur FN, Khan KM. Identification of hydrocarbons from *Abies pindrow* leaves. *Chem Nat Comp D*.
- [32] Samejo MQ, Ndukwe GI, Burdi DK, Bhanger MI, Khan KM. Isolation and crystal structure of maltol from *Abies pindrow*. *J Med Plants Res*.
- [33] Tripathi M, Jain L, Pandey VB, Ray AB, Rucker G. Pindarolactone. A lanostane derivative from the leaves of *Abies pindrow*. *Phytochemistry*. 1996;43(4):853 855.
- [34] Burdi DK, Samejo MQ, Bhanger MI, Khan KM. Fatty acid composition of *Abies pindrow* (West Himalayan Fir). *Pak J Pharm Sci*. 2007;20(1):15-19.
- [35] Padalia RC, Verma RS, Chauhan A, Goswami P, Chanotiya CS. Chemical analysis of volatile oils from West Himalayan Pindrow Fir *Abies pindrow*. *Nat Prod Commun*. 2014;9(8):1181-1184.
- [36] Kumar D, Kumar S. Quantitative determination of Shikimic acid and Pinitol in *Abies pindrow* aerial parts using TLC. *Indian J Pharm Sci*. 2016;78(2):287-290.
- [37] Devrani MK, Rawat K, Chandra D, Prasad K, Bisht G. Phytochemical studies and GC MS analysis of *Abies pindrow*. *World J Pharm Res*. 2017;6(7):1639-1644.
- [38] Khan MA, Khan MA, Hussain M, Mujtaba G. An ethnobotanical inventory of Himalayan Region Poonch Valley Azad Kashmir (Pakistan). *Ethnobot Res Appl*.
- [39] Gilani SA, Qureshi RA, Farooq U. Ethnobotanical studies of Ayubia National Park, District Abbotabad, Pakistan. *Online J Biol Sci*.
- [40] Bano A, Ayub M, Rashid S, Sultana S, Sadia H. Ethnobotany and conservation status of floral diversity of Himalayan range of Azad Jammu and Kashmir-Pakistan. *Pak J Bot*.
- [41] Ishtiaq M, Iqbal P, Hussain T. Ethnobotanical use of gymnosperms of Neelam valley and Muzaffarabad of Kashmir. *Indian J Tradit Knowl*
- [42] Hussain M, Shah GM, Khan MA. Traditional medicinal and economic uses of Gymnosperms of Kaghan Valley, Pakistan. *Ethnobot leaflets*.
- [43] Lone V. Tree diversity and economic importance of forest trees of Kashmir (Jammu and Kashmir), India. *Int J Fundamental Applied Sci*.

- [44] Pant S, Samant SS. Ethnobotanical observations in the Mornaula Reserve Forest of Kumaon, West Himalaya, India. *Ethnobot Leaflets*.
- [45] Bhat JA, Kumar M, Bussmann RW. Ecological status and traditional knowledge of medicinal plants in Kedarnath Wildlife Sanctuary of Garhwal Himalaya, India. *J Ethnobiol Ethnomed*.
- [46] Tiwari JK, Dangwal LR, Rana CS, Tiwari P, Ballabha R. Indigenous uses of plant species in Nanda Devi Biosphere Reserve, Uttarakhand, India. *Rep Opin*
- [47] Kumar DP, Kumar A, Bhupender D, Sachin S. Ethnobotanical knowledge and usage of wild plants in Theog Forest Division, Himachal Pradesh, North Western Himalaya. *J Ethnobiol Tradit Med*.
- [48] Kunwar RM, Fadiman M, Cameron M, Bussmann RW, Thapa-Magar KB, Rimal B, Sapkota P. Cross-cultural comparison of plant use knowledge in Baitadi and Darchula districts, Nepal Himalaya. *J Ethnobiol Ethnomed*. 2018;14(1):40.
- [49] Hughes LD, Raitt N, Riaz MA, Baldwin SJ, Erskine K, Graham G. Primary care hypnotic and anxiolytic prescription: Reviewing prescribing practice over 8 years. *J Family Med Prim Care*. 2016;5(3): 652–657.
- [50] Kumar V, Singh RK, Jaiswal AK, Bhattacharya AK, Acharya SB. Antixiolytic activity of Indian *Abies pindrow* Royle leaves in rodents: An experimental study. *Indian J Exp Biol*. 2000; 38:343-346.
- [51] Röder PV, Wu B, Liu Y, Han W. Pancreatic regulation of glucose homeostasis. *Exp Mol Med*. 2016;48(3):219.
- [52] Sökmen M, Akram Khan M. The antioxidant activity of some curcuminoids and chalcones. *Inflammopharmacology*. 2016;24(2-3):81–86.
- [53] Stepanić V, Matijašić M, Horvat T, Verbanac D, Kučerová-Chlupáčová M, Saso L, Žarković N. Antioxidant activities of Alkyl Substituted Pyrazine derivatives of Chalcones-In vitro and In silico study. *Antioxidants (Basel)*. 2019;8(4):90.
- [54] Takac P, Kello M, Pilatova MB, Kudlickova Z, Vilkova M, Slepčikova P, Petik P, Mojzic J. New chalcone derivative exhibits antiproliferative potential by inducing G2/M cell cycle arrest, mitochondrial-mediated apoptosis and modulation of MAPK signalling pathway. *Chem Biol Interact*. 2018; 292:37-49.
- [55] Dos Santos MB, Bertholin Anselmo D, de Oliveira JG, Jardim-Perassi BV, Alves Monteiro D, Silva G, Gomes E, Lucia Fachin A, Marins M, de Campos Zuccari DAP, Octavio Regasini L. Antiproliferative activity and p53 upregulation effects of chalcones on human breast cancer cells. *J Enzyme Inhib Med Chem*. 2019;34(1): 1093–1099.